

### **DETAILED ACTION**

Claims 1-17 are cancelled; claim 18 has been amended, claims 19-25 are added as new claims; and 18-25 are pending in application.

#### ***Status of the Previous Rejection***

The previous rejections of claims 1-17 under 35 U.S.C. 103(a) are withdrawn since claims 1-17 are cancelled in view of the amendment filed on 12/29/2009.

The previous rejections of claim 18 under 35 U.S.C. 103(a) as being unpatentable over Kuroda et al (US 6,372,056 B1, thereafter US'056) is withdrawn in view of the amendment filed on 12/29/2009.

However, upon further consideration, a new ground(s) of rejection is made as following.

The previous rejections of claim 18 under 35 U.S.C. 103(a) as being unpatentable over Minami et al (NPL: Drawing high-grade steel wire rods without heat treatment" wire journal international, Vol. 16, XP008063056, pp. 236-247, Sept. 1983, thereafter, NPL-1) is withdrawn in view of the amendment filed on 12/29/2009.

However, upon further consideration, a new ground(s) of rejection is made as following.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18, 19, and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroda et al (US 6,372,056 B1, thereafter US'056) in view of Bae et al (US 6,264,759 B1, thereafter US'759).

US'056 is applied to the claim 18 for the same reason as stated in the previous office actions dated 9/29/2009.

Regarding claim 18, US'056 does not specify 0.3wt% or less Cr (excluding zero) as amended in the instant claim 18. US'759 teaches a wire rod alloy with major composition ranges (claims 1-4 of US'759) overlapping with the composition ranges recited in the instant invention using in making bead wires, wire ropes and spring (Abstract of US'759). US'759 teaches adding 0.3wt% or less Cr in the alloy, which overlaps the Cr range as recited in the instant claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add proper amount Cr in the alloy as demonstrated by US'759 in the spring steel of US'056 because US'759 teaches: "Chrome increases the hardenability of the steel, and makes the inter-lamellar spacing fine to increase the strength and the ductility. However, if it is added excessively, martensites may occur during the cooling of the stock, and therefore, its upper

limit should be 0.3%. More preferably the Cr content should be limited to 0.15-0.25%." (Col.5, lines 49-54 of US'759).

Regarding the limitation of loading density during cooling in the amended claim 18 and newly added claim 19, it is process limitation in a product-by-process claim. In the absence of structural characteristics imparted by the claimed process limitations, the claimed process limitations would not add patentable weight to the present wire rod claims. MPEP 2113 R1.

Regarding claims 21-24, US'056 discloses 0.2 to 0.5 weight percent Ni, which overlaps the range of 0.3 or less mass percent Ni, excluding zero as in the instant claim 21 (Claim 2 of US'056); US'056 teaches optional adding 0.02-0.09wt%Ti and 0.02-0.5wt%Nb (Claim 2 of US'056), which overlap the additional elements in a total amount of 0.1wt% or less, excluding zero, at least one selected from group consisting of Nb, V, Ti, Hf, and Zr as recited in the instant claim 22; US'056 teaches including unavoidable impurities in the alloy, which satisfy the limitation of N in an amount of 0.01wt% or less, excluding zero (claim 23); and the limitation of Al in an amount of 0.05wt% or less, excluding zero, and Mg in an amount of 0.01wt% or less, excluding zero (claim 24).

Regarding claim 25, US'056 does not explicitly state the alloy for a wire rod further contains B: 0.001 to 0.005wt%. US'759 teaches B content should be preferably limited to 10-30 ppm (Col.5, line 55-64 of US'759). This B composition range is within the range of 0.001 to 0.005wt%B as recited in the instant claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add 0.001 to 0.005wt. of B as disclosed by US'759 in the wire rod of US'056 to reinforce the hardenability of the steel to inhibit the formation of ferrite (Col.3, line 51-60 of US'759).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over US'056 in view of US'759, and further in view of Tsukamoto (US 5,156,692, thereafter US'692).

US'056 in view of US'759 does not explicitly state that the average diameter of nodules in said pearlite structure is 10  $\mu$ m or less. US'692 teaches a process for manufacturing steel wires for use in wire drawing, and particularly steel wires which are subsequently subjected to final wire drawing to form steel filaments which are used in the manufacture of steel cord wires (Col.1, line 6-10). US'692 teaches the resulting pearlite has a pearlite block size of not greater than 5.0  $\mu$ m, which is in the range of 10  $\mu$ m or less nodules diameter of pearlite structure

recited in the instant claim. US'692 teaches similar composition alloy (Col.7, line 21-25 of US'692), with similar fine pearlite structure (Col.3, line 16-27 of US'692), for the same steel wire drawing application (Col.1, line 6-10) as the instant invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a fine pearlite grain size (or be called pearlite blocks), for example, less than 10  $\mu\text{m}$  as demonstrated in US'692 in the hot-rolled wire of US'056 in view of US'759 to improve drawability of the steel wire (Col.3, line 15-27 of US'692).

Claim18, 19, and 21-25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al (NPL: Drawing high-grade steel wire rods without heat treatment" wire journal international, Vol. 16, XP008063056, pp. 236-247, Sept. 1983, thereafter, NPL-1) in view of US'759.

US'056 is applied to the claim 18 for the same reason as stated in the previous office actions dated 9/29/2009.

NPL-1 does not specify 0.3wt% or less Cr (excluding zero) as amended in the instant claim 18. US'759 teaches a wire rod alloy with major composition ranges (claim 1-4 of US'759) overlapping with the composition ranges recited in the instant invention for using in making bead wires, wire ropes and spring

(Abstract of US'759). US'759 teaches adding 0.3wt% or less Cr in the alloy, which overlaps the Cr range as recited in the instant claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add proper amount Cr in the alloy as demonstrated by US'759 in the wire rod of NPL-1 because US'759 teaches: "Chrome increases the hardenability of the steel, and makes the inter-lamellar spacing fine to increase the strength and the ductility. However, if it is added excessively, martensites may occur during the cooling of the stock, and therefore, its upper limit should be 0.3%." More preferably the Cr content should be limited to 0.15-0.25%." (Col.5, lines 49-54 of US'759).

Regarding the limitation of loading density during cooling in the amended claim 18 and newly added claim 19, it is process limitation in a product-by-process claim. In the absence of structural characteristics imparted by the claimed process limitations, the claimed process limitations would not add patentable weight to the present wire rod claims. MPEP 2113 R1.

Regarding the additional elements: 0.3wt%Ni or less, excluding zero (claim 21), 0.1wt% or less one of Nb, V, Ti, Hf, and Zr, excluding zero (claim 22), 0.01wt%N or less, excluding zero (claim 23), and 0.05wt%Al or less, excluding zero and

0.01wt%Mg, excluding zero (claim 24), US'759 teaches including unavoidable impurities in the alloy (Abstract of US'759), which satisfy the claimed limitations.

Regarding claim 25, NPL-1 does not explicitly state the alloy for a wire rod further contains B: 0.001 to 0.005wt%. US'759 teaches B content should be preferably limited to 10-30 ppm (Col.5, line 55-64 of US'759). This B composition range is within the range of 0.001 to 0.005wt%B as recited in the instant claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add 0.001 to 0.005wt. of B as disclosed by US'759 in the alloy of NPL-1 to reinforce the hardenability of the steel to inhibit the formation of ferrite (Col.3, line 51-60 of US'759).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over NPL-1 in view of US'759, and further in view of US'692.

NPL-1 in view of US'759 does not explicitly state that the average diameter of nodules in said pearlite structure is 10  $\mu\text{m}$  or less. US'692 teaches a steel wires for use in wire drawing, and particularly steel wires which are subsequently subjected to final wire drawing to form steel filaments which are used in the manufacture of steel cord wires (Col.1, line 6-10). US'692

teaches the resulting pearlite has a pearlite block size of not greater than 5.0  $\mu\text{m}$ , which is in the range of 10  $\mu\text{m}$  or less nodules diameter of pearlite structure recited in the instant claim. US'692 teaches similar composition alloy (Col.7, line 21-25 of US'692), with similar fine pearlite structure (Col.3, line 16-27 of US'692), for the same steel wire drawing application (Col.1, line 6-10) as the instant invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a fine pearlite grain size (or be called pearlite blocks), for example, less than 10  $\mu\text{m}$  as demonstrated in US'692 in the hot-rolled wire of NPL-1 in view of US'759 to improve drawability of the steel wire (Col.3, line 15-27 of US'692).

### ***Response to Arguments***

Applicant's arguments with respect to claims 18-25 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP



§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jie Yang whose telephone number is 571-270-1884. The examiner can normally be reached on M-F, 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JY

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